The Nissan Leaf was selected as the electric vehicle of choice. The Nissan Leaf would be a reasonable choice for this system because, the Leaf is a full electric vehicle with one of the largest battery sizes. Thus, taking longer to charge then most other vehicles allowing the system to be designed for a worst-case scenario. The system will also be designed for the times at which the owners of the cars will be leaving their cars to charge in lot F, if the owners will be primarily using the system during the day. We are also assuming that the car has discharged about 70% of the battery, so hence the charger will need to provide 21 kWh to the 30 kWh battery of the Leaf.

Table 1. GE vs Charge Point

|  |  |  |
| --- | --- | --- |
|  | GE | Charge Point |
| SAE Compliant | Level II per J1772 | Level II per J1772 |
| Vehicle Interface | SAE J1772 EV connector | SAE J1772 EV connector |
| Cable length | 20’ cable | 8’ cable |
| AC Charging Power Output | 7.2kW (240VAC @ 30A) | 7.2kW (240V AC @ 30A) |
| Voltage and Current Rating | 208-240VAC @ 30A | 240V AC@30A) |
| Ac Power Input | 208-240VAC requiring only Line 1, Line 2, and Earth ground | 208-240VAC requiring only Line 1, Line 2, and Earth ground |
| Standby Power | 5W typ. | Not listed |

Two charging stations where analyzed for the system. The GE Durastation Duel EV Charger and the Charge Point CT4000 Charger(datasheets in Appendix A). These two chargers have very similar properties as can be seen in Table 1. They both have duel Level 2 chargers and SAW j1722 connectors and have similar Electronic specifications. Since the Nissan leaf will be a heavy load battery a Level 2 charger will be need for fast charger and with the 70 percent depleted the charge time will roughly be around 3 hours with the Level 2 charger. Both also have modern connectivity and easy maintenance capabilities but the GE has a advantage in that the cable length is longer and the power on standby is actually communicated in the datasheet allowing for more accurate power consumption predictions. The GE system will run at a rate of 7.2 kW an hour and while the system is idle will consume 5W, thus it will roughly take 3 hours to completely charge the battery. Shown in table 2 is a breakdown of the power drawn throughout the day. Figure 1 is a graph depicting the total load on the system. Table 2 depicts the power consumption to charge the car for 50 50 week span which is 7560kW. These assumptions where made by using the typical charging times of the Nissan leaf at lot F.

Table 1. Power Drawn from GE Durastation to charge four Nissan Leaf’s

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Time | 6:00 AM | 7:00 AM | 8:00 AM | 9:00 AM | 10:00 AM | 11:00 AM | 12:00 PM |
| Car 1 | 0 | 5W | 5W | 7.2kW | 7.2kW | 7.2kW | 5W |

Table 2. Year consumption break down

|  |  |
| --- | --- |
| Time | kW |
| 1 Day | 21.6 |
| 1 Week | 151.2 |
| 50 week | 7560 |

Figure 1. Power Drawn from GE Durastation to charge four Nissan Leaf’s

GE

<http://apps.geindustrial.com/publibrary/checkout/DET-743D?TNR=Application%20and%20Technical%7CDET-743D%7Cgeneric>

<http://www.gelighting.com/LightingWeb/na/images/DEH535-Gen2-GE-DuraStation-EVSE-Charger-User-Manual_tcm201-116718.pdf>

Charge point

<https://www.chargepoint.com/files/brochures/br-ct4000.pdf>

<https://www.chargepoint.com/files/datasheets/ds-ct4000.pdf>